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When is it acceptable to kill a strictly protected carnivore? Exploring the legal constraints on wildlife management within Europe's Bern Convention

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Abstract

As wolf populations expand across Europe, many countries face challenges in finding ways to address the concerns of some elements among the rural stakeholders who are being asked to share their landscapes with wolves for the first time in several generations. In these recovery landscapes, wolves are associated with a wide range of conflicts that include economic, psychological, perceptional, social, cultural and political dimensions. A recurring demand concerns the desire to introduce the use of carefully regulated lethal control of wolves, through either culling by state employees or hunting conducted by rural hunters. Introducing such measures can be very controversial, and many critics challenge their legality under the international wildlife conservation instruments that have nurtured wolf recovery. We evaluate this issue for the case of wolves in Norway, which are strictly protected under the Bern Convention. Drawing on the latest results of social science research, we present the multiple lines of argumentation that are often used to justify killing wolves and relate these to the criteria for exceptions that exist under the Bern Convention. We conclude that while the Convention provides apparent scope for allowing the killing of wolves as a means to address conflicts, this must be clearly justified and proportional to the conservation status of wolves so as to not endanger their recovery.

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Introduction

The last century has seen a dramatic recovery of large mammals in Europe. The first half of the 20th century saw the recovery of Europe's forests and large herbivores (Linnell and Zachos 2011) with large carnivores recovering in the latter half of the century (Chapron et al. 2014). This recovery was brought about by both active (reintroduction) and passive (fostering natural expansion) means; but builds on a fortunate coincidence of social, cultural, economic and ecological circumstances, and has been aided by wildlife conservation legislation at national and international levels (Linnell et al. 2009). Broadly speaking the task for the 21st century consists of learning to manage this success and ensure that the recovery is sustained (Swenson et al. 1998). Many ambitious visions of how far this recovery can continue are often articulated within the frames of the emerging rewilding discourse, for example. However, the growth of many conflicts (Redpath et al. 2013) associated with wildlife populations forces the consideration of the need to potentially limit recovery at levels below the biological potential (Boitani and Linnell 2015; Trouwborst et al. 2017a).

Many tools in the wildlife management toolkit can be used to foster a situation of coexistence rather than conflict (Carter and Linnell 2016). For example, there are a range of measures that can be adopted to protect crops and forests from herbivores and livestock from large carnivore attacks (Breitenmoser et al. 2005; Linnell et al. 2012), and many forms of structured dialogue exist to defuse social conflicts (Maser and Polio 2012; Reed 2008). Although these non-lethal methods may sometimes be challenging to implement they are usually not very controversial *per se*. In contrast, the use of lethal measures that involve killing wildlife can be highly controversial, from ecological, social, and legal points of view. This is especially true for large carnivores whose conservation is governed by various international legal instruments in addition to national and regional legislation.

In Europe, the most important pieces of international legislation are the 1979 Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats) administered by the Council of Europe, and the 1992 Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora) administered by the European Union. All EU countries are subject to both instruments, whereas most European countries outside the European Union are subject to the Bern Convention only. International legislation is especially important in coordinating the conservation of highly mobile and low density species like large carnivores whose populations typically stretch across multiple countries (Trouwborst 2015a). It is widely recognized that international legislation such as these two instruments has been instrumental in fostering the recovery of large carnivores in Europe (Chapron et al. 2014; Fleurke and Trouwborst 2014). However, a key emerging question is to what extent international legislation provides constraints on the possibilities of individual countries adopting controversial measures such as lethal control.

In this article, we aim to provide background into the circumstances where lethal control has been claimed to offer potential utility and then explore the extent to which this can be permitted within the scope of the Bern Convention. We do not explore in depth

the validity, or evidence base, behind the different claims as this would be far beyond the scope of a single paper. However, we do provide citations where they exist to relevant articles to document the plausibility of the claims. Our focus is the case of wolf (*Canis lupus*) management in Norway, which offers an extreme example of how a government seeks to use lethal control to severely limit population expansion to a bare minimum. However, this case study is directly relevant for parallel debates ongoing in other European countries, the United States, and other countries for wolves and other large carnivores, and we draw insights from parallel discourses and controversies for other species and countries.

This article is based on a range of methods, including; reviews of the available social science and ecological literature, multiple stakeholder dialogue processes at regional, national and European levels, twenty years of networking between researchers and wildlife managers across Europe and standard legal analysis methodology (Trouwborst 2015b). Most relevant are extensive stakeholder processes which were initiated in Norway in 2002-2003 (Andersen et al. 2004) along with 20 years of associated social science research. At the European scale, we draw on a series of stakeholder workshops organized for the European Commission between 2006 and 2014 in multiple countries across Europe (Linnell et al. 2008; Linnell 2013). Because the intention (teleology) of the law is a crucial part of any evaluation of areas that are not clear, we have included detailed discussions of ecological and social science aspects of wolf conflicts.

Europe's carnivores – recovery and conflicts

Historically, the populations of large carnivores in Europe were greatly reduced and even exterminated because of conflicts of interest with humans. Many of these conflicts have resurfaced as their populations expand, and have been joined by several new conflicts specific to our modern times. There has been intensive research from multiple disciplinary perspectives into these conflicts during the last 30 years to the extent that there is now a very good understanding of these issues (Redpath et al. 2013). The most important finding is that conflicts are diverse, occur along multiple dimensions, and can be highly variable across different contexts.

The most familiar conflict dimensions concern the direct economic and material impacts that large carnivores have on human property and activities. Depredation on livestock is a widespread problem for all large carnivore species (Kaczensky 1999). In addition, bears (*Ursus arctos*) are associated with damage to beehives, fruit trees and some agricultural crops (Bautista et al. 2017). However, recent research by the social sciences has also revealed the overriding importance of a set of conflict dimensions that do not directly concern economic losses (Linnell 2013; Redpath et al. 2013). Fear is a frequent component of conflict discourses. While the fear of bear attacks is easy to understand because the risks they represent are well understood (Penteriani et al. 2016), the fear of wolves has also emerged as a major discourse in areas where they return after long absences, despite the extremely low risk of actual attack (Røskaft et al. 2003; Linnell and Alleau 2015). A range of other social conflicts exist where large carnivores, especially wolves,

have become symbols and surrogates for wider struggles such as those between traditional rural and urban publics, over modern vs traditional lifestyles and values, over different knowledge systems, and the struggle for power between regional, national and international bodies (Skogen et al. 2013). In other words, as well as conflicts between people and wolves there are conflicts between different groups of people about wolves, and especially about how they should be managed. However, it is also important to point out that many rural residents are positive about the presence of large carnivores, including wolves.

Based on considerable experience within networks of wildlife researchers and managers, we know that there is currently a broad understanding that sustaining large carnivores in the human dominated landscapes of modern day Europe requires a high degree of pragmatism and flexibility, especially when it comes to respecting the concerns of some segments of the rural publics whose lifestyles, livelihoods and well-being are the most directly affected. In many areas, this has led managers to allow some forms of lethal control and / or hunting of large carnivores. We explore the motivations for this in the next section, but first want to underline that well-regulated lethal control does not automatically represent a conflict with conservation goals. There is considerable experience within wildlife management institutions to manage hunting and control of large mammals, including large carnivores, through adaptive management frameworks where regular population monitoring is used to update quotas to minimize undesired developments in the size and distribution of the population (Linnell et al. 2010; Swenson et al. 1998). Our current biological understanding of these species also underlines that their interests are best served by fostering widespread and interconnected populations, and that this is more important than achieving locally high densities, especially when considering the long term need for gene flow (Linnell et al. 2008; Trouwborst et al. 2017a).

The multi-functionality of large carnivore hunting

In line with recent steps to recognize the multi-functionality of agriculture, there has been an increased recognition that hunting also serves multiple functions (Fischer et al. 2013). In the case of large carnivores there are at least seven lines of arguments that emerge from social science research and stakeholder engagement processes (Andersen et al. 2004; Bisi et al. 2007; Hiedanpää and Bromley 2011; Linnell 2013; Majic et al. 2011). We are not explicitly judging the objective validity of these arguments in this paper, but are rather trying to outline the arguments that are frequently raised by some rural stakeholders in favour of permitting the use of some form of lethal control and / or hunting of wolves. When it is considered how much focus is recently being placed on the need to manage perceptions of conflict as much as measurable and economic components of conflict (Redpath et al. 2013), there is clearly a need to give these arguments serious consideration. The overall relevance of these arguments is the claim that permitting lethal control and / or hunting will address some of the many conflicts associated with large carnivores. This is often summarized in the idea that being flexible on the means of conservation (i.e. not insisting on unconditional strict protection)

will increase tolerance for larger populations of large carnivores spread over larger areas (Boitani and Linnell 2015). Our goal in this article is not to formally evaluate the validity of, or advocate, this argument. Rather we want to explore the extent to which the Bern Convention provides the flexibility to even consider such a strategy. In an earlier article (Trouwborst et al. 2017b) we have explored the issue of the level of conservation ambition (i.e. in terms of population *goals*) which the Bern Convention requires. In this article, we want to explore the issue of the *means* (i.e. when can lethal control be used) that are available to achieve these goals.

(1) **To reduce damage to livestock**. Lethal control or hunting can be used in many different ways to reduce damage to livestock. In some special cases where damage is caused by specific individuals it may be possible to selectively remove them, which may require very carefully targeted reaction or the use of "caught-in-the-act" mechanisms to kill specific individuals (Linnell et al. 1999). Translocation is no longer viewed as being a suitable non-lethal method for most situations (Linnell et al. 1997). Typically, above benefits cannot be achieved through a *de facto* hunting approach that tends to be conducted outside the grazing seasons and does not usually permit such careful targeting. However, hunting can also be used to lower the population density of carnivores in an area, which may lower depredation if depredation is density dependent (Herfindal et al. 2005; Tveraa et al. 2014; Mabille et al 2015), and it can be used to help prevent carnivore colonization of areas where local conflicts with livestock can be assumed to be inevitably high.

(2) **To maintain shyness**. The issue of individual wolves and bears not displaying the desired or expected level of shyness to humans has emerged as a key conflict area across Europe. While the phenomena associated with bears and food conditioning / habituation are relatively well understood from an ecological and management point of view (Huber et al. 2016), the parallel issue with wolves is not well documented (Linnell and Alleau 2015). The use of targeted control to remove specific individuals that display specific undesired behaviours is established as a fairly normal part of wildlife management practices, although it can still be controversial in certain cases (Rosen and Bath 2009). However, the utility of normal hunting to maintain shyness and prevent problematic behavior is not well documented, although it is widely claimed by hunters and rural residents to have such benefits (Cromsigt et al. 2013). Potential mechanisms include both behavioural learning through the disturbance associated with the process of hunting, and selection on different time scales by removing individuals with either learnt or inherited boldness (Borg et al. 2016; Starling et al. 2013).

(3) **Reducing competition for game with hunters.** Hunting wild ungulates for recreation, meat and trophies is widespread across most of Europe's surface, including within many protected areas. In addition, the hunting of wild ungulates helps provide benefits (economic and recreational) that offset some of the costs associated with their presence in human-dominated landscapes. There is widespread concern among hunters that the presence of large carnivores will lead to lower potential harvests and / or declines in prey (Andersen et al. 2006). Our current understanding of predator impacts on wild ungulates in Europe indicates that such impacts are likely to be highly context dependent, but where they are a potential issue the only way to alleviate them – bar-

ring a change in attitude and expectations by the hunters – is by maintaining carnivore populations at levels lower than their ecological carrying capacity. Another specific conflict with hunters in the Nordic countries concerns the tendency of wolves to kill hunting dogs (Butler et al. 2014). Although this phenomenon is not well understood, there is some evidence (Kojola et al. 2004), and widespread belief, that this behaviour is associated with specific wolf packs, which hunters then would like to see removed.

(4) **Empowerment**. The results of social science research indicate that many social conflicts are associated with rural communities that are asked to share their neighbourhoods and properties with large carnivores feeling a sense of disempowerment in the face of legislation imposed by distant external authorities (e.g. Hiedanpää 2013). Although dialogue processes and innovative management structures can provide some conflict reducing benefits concerning decision making, there are clearly limits to what can be achieved in such controversial conflicts (Hiedanpää and Bromley 2013; Madden and McQuinn 2014). There remains a frequently expressed desire from many rural people to be able to directly influence their own interactions with wolves using lethal control and / or hunting. This is often expressed in association with a desire to regulate the size and density of local populations, or at least to slow the rate of recovery to allow social / cultural adaptation to keep pace with the ecological changes (Carter and Linnell 2016; Kaltenborn and Brainerd 2016).

(5) **Normalisation**. In many parts of rural Europe sustainable hunting represents the "normal" form of human – wildlife relationship, for example with respect to other large mammals like deer and wild boar across most of the landscape. Norwegian laws (constitution, wildlife law, biodiversity law and animal welfare law) formally legitimise a philosophy that permits the sustainable use of natural resources, including wildlife, for economic, cultural and recreational purposes. A similar philosophy is also enshrined in the Convention on Biological Diversity which has a major influence on current European environmental law. Under such a regime, the act of killing wildlife is not viewed as being morally wrong in itself, although the process is subject to many restrictions related to ensuring sustainability and to animal welfare, public safety and property right considerations. This must be viewed in relation to a specific view of human – nature interactions which centers around ideas of active stewardship rather than passive protection (Kaltenborn et al. 2013a; Linnell et al. 2015). Therefore, when wildlife species like wolves receive strict protection it essentially conveys a different status on them, moving them from being "normal" and "natural" parts of the local fauna to being "the government's" animals and therefore less "natural". This alienation is associated with an opposition to accepting them and to accepting responsibility for adapting to their presence (Skogen et al. 2006). It is frequently suggested that allowing some form of hunting will "normalize" the presence of large carnivores, which is a crucial step towards building tolerance.

(6) **Adding value**. Permitting some form of *de facto* hunting creates the potential of attaching some value to the presence of large carnivores to help offset some of the costs. These values can be both in the form of economic values through the sale of trophy hunting licenses (Knott et al. 2014) and / or recreational values for rural residents (Kaltenborn et al. 2013a). This latter form of value can be seen in keeping with a way

of valuing wildlife based on relational values (sensu Chan et al. 2016) and a more traditional European view of nature conservation (Linnell et al. 2015). These economic and non-economic values can in principle help to raise the symbolic value of the wolf.

(7) **Reducing poaching**. The idea that illegal killing of wildlife will decrease as a result of allowing legal lethal control and / or hunting is widespread in the literature, although it is often posited without due consideration of the diverse motivations that underlie illegal killing (Chapron and Treves 2016), or the diversity of social and institutional contexts (Olson et al. 2015). For example, it is not only among poachers or potential poachers that management is seeking to gain tolerance as there are many other legal political pathways by which people can undermine conservation goals (Skogen and Krange 2003; Skogen et al. 2013). These nuances are highly likely to influence the logic underpinning the expected effect of legal harvest on illegal killing. However, in the case of Norwegian wolves it is not an unreasonable expectation that allowing legal harvest might prevent some of the illegal killing (indirectly supported by Kaltenborn and Brainerd 2016). While the outcome for the individual animal is the same (Vucetich et al. 2017), it has huge consequences for management as it permits greater precision in decision making as legal mortality is subject to regulation and monitoring, and poaching just induces stochasticity.

In summary, there are significant numbers of rural stakeholders which have raised multiple lines of argumentation in favour of allowing a relatively liberal use of exceptions to the strict protection status for wolves. These arguments involve the use of killing to manage both the economic conflicts and the perceptional / social conflicts associated with wolves. In effect, the arguments raised are based on the idea that allowing the killing of wolves, at levels that do not jeopardise their conservation status, will increase rural tolerance for the presence of wolves. As phrased here, the beneficial effect of allowing this killing will be enhanced if the killing is done by rural residents (rather than state agents) within a framework that approximates normal hunting as much as possible. A key aspect that has emerged in recent discussions about the pros and cons of lethal control concerns the need to demonstrate a utility of allowing control (Chapron and Treves 2016; Treves et al. 2016; Vucetich et al. 2017). These authors have focused on single or narrow dimensions of utility, which do not recognise most of the diverse aspects outlined above. Our point is that many traditional rural stakeholders identify multiple forms of utility, which are often based on a moral default position that does not assume that killing wildlife is wrong. Evaluating the support for these hypothetical relationships between killing and conflict goes beyond the scope of this article, although we hope this article will stimulate research on these issues. The question we do ask is whether this would be legal or not within the framework of the Bern Convention?

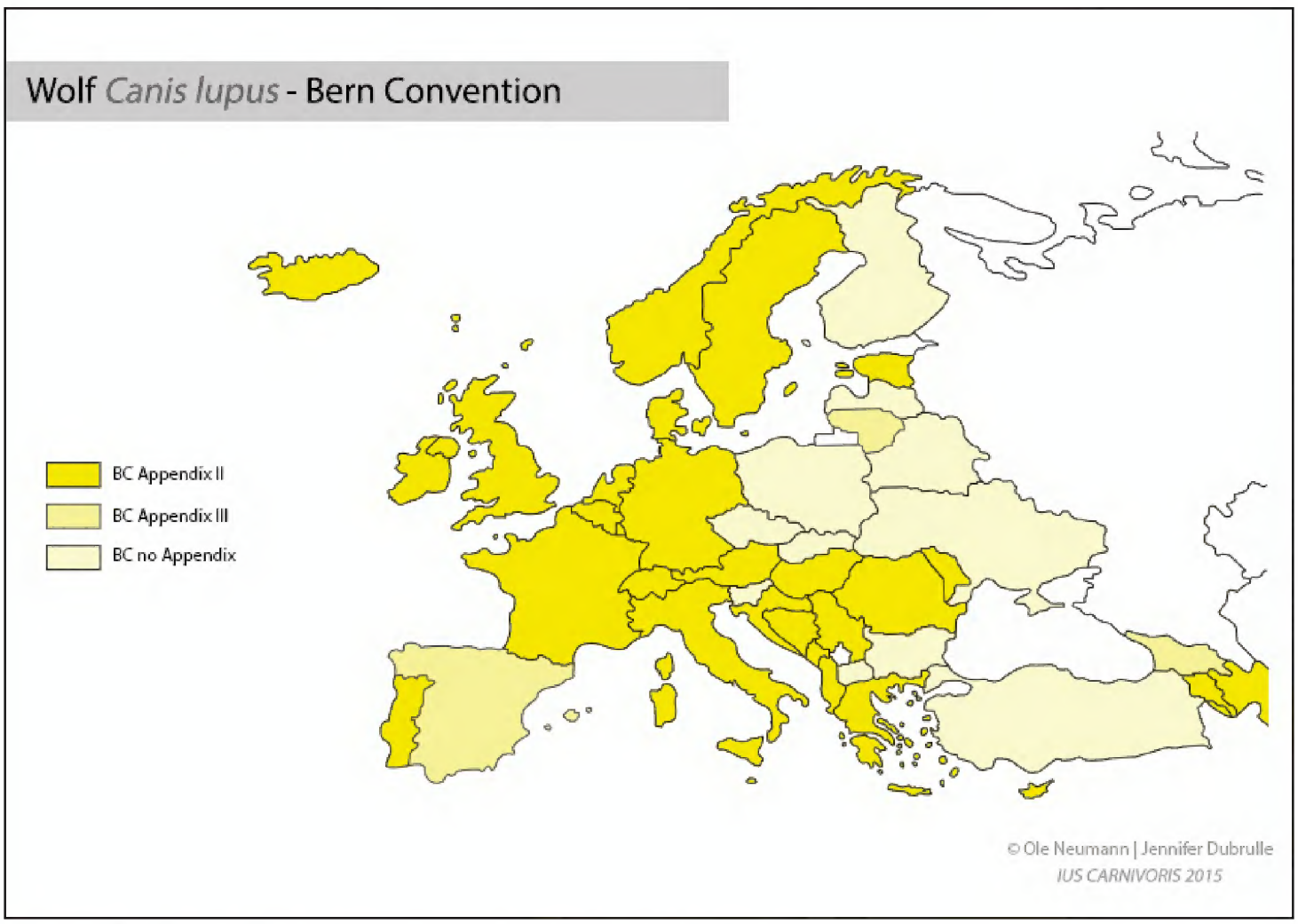
Large carnivores under the Bern Convention

Wolves are a typical example of a species for which international conventions like the Bern Convention where created as their populations span international borders and require cooperation between countries to achieve long term conservation gains (Trou-

wborst 2010, 2015). At the time that the Bern Convention was drafted in 1979, wolves where much less widespread in Europe than today, so it was logical that they were placed on Appendix II which conveys "strict protection", requiring a prohibition on *inter alia* the killing of any individuals (Article 6). Most of the countries that had large wolf populations at the time of ratifying the Convention submitted reservations exempting them from this designation, as permitted under Article 22 of the Convention (Salvatori and Linnell 2005). Lithuania and Spain opted to treat wolves as if they were on Appendix III, which generally permits sustainable exploitation but prohibits certain means of capture and killing (Articles 7 and 8), while other countries (Finland, Latvia, Belarus, Poland, Czech Republic, Slovakia, Ukraine, Bulgaria, and Macedonia) took a total reservation. The resulting legal landscape for wolves under the Convention is depicted in Figure 1. The expansion of wolves during recent decades has led to a situation where wolf population status has significantly improved in many areas, including in areas where they receive strict protection under Appendix II. In addition, some of the newer European countries and later contracting parties (e.g. Bosnia and Herzegovina, Montenegro, Albania, Romania, Croatia, Serbia, Estonia) with substantial wolf populations failed to file reservations regarding wolves upon ratifying the Convention. These two developments have led to varying degrees of actual or perceived mismatch between wolf population status within a country and its protection status under the Convention. Norway did not file a wolf reservation either, but wolves were (largely) absent from the country when it ratified the Bern Convention in 1986. At any rate, in Norway there is no mismatch between the strict protection status under the Convention and their currently minimal wolf population. Similar considerations apply to Switzerland.

A note on interpreting the Convention and its relationship with the EU Habitats Directive

Article 9 of the Bern Convention states various criteria that need to be met before exceptions from strict protection can be made. The article should be read in light of the general rules governing treaty interpretation. According to the 1969 Vienna Convention on the Law of Treaties (VCLT) and customary international law, a treaty should be interpreted "in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose" (Vienna Convention, Article 31.1). In addition to treaty text and objectives, "any subsequent agreement between the parties regarding the interpretation of the treaty or the application of its provisions", "any subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation", and "any relevant rules of international law applicable" may be taken into account (Vienna Convention, Article 31.3). Finally, the original intentions of the parties, as recorded in the treaty's drafting history, can be considered as a supplementary means if necessary. In the case of the Bern Convention, an "Explanatory Report" records some of the intentions of the *ad hoc* Committee that drafted the Convention text. Whereas


Wolf Canis lupus - Bern Convention
BC Appendix II
BC Appendix III
BC no Appendix
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IUS CARNIVORIS 2015

Figure 1. The legal status of wolves under the Bern Convention.

the Report itself notes that it "may facilitate the understanding of the Convention's provisions," the Report "does not constitute an instrument providing an authoritative interpretation of the text of the Convention" (Explanatory Report, para. II). Of special relevance for our present purposes is Revised Resolution No. 2 (1993), adopted in 2011 by the Standing Committee of the Bern Convention (the Convention's main decision-making body in which all parties are represented) in order to "further clarify the conditions laid down in Article 9 for the granting of exceptions." The Resolution has an Appendix entitled "Interpretation of Articles 8 and 9 of the Bern Convention" [hereinafter "Appendix to Resolution No. 2"]. In the Resolution itself, the Standing Committee "recommends that Contracting Parties bring the appended document, which contains useful guidance for interpreting the scope of Article 9, to the attention of all those responsible for applying and interpreting the Convention in their respective countries". Within the scheme of the VCLT, the guidance provided in the Appendix thus appears to have significant interpretive value in terms of "subsequent agreement". We also draw attention to the legal analysis prepared by a consultant in connection with the development of Revised Resolution No. 2, which is a helpful background document (Shine 2010).

The case law of the Court of Justice of the EU (CJEU) and the European Commission's guidance regarding the application of derogations from strict protection under Article 16 of the Habitats Directive – the counterpart (and implementation) of Article 9 of the Bern Convention – is instructive too. Even if this case law and guidance do not

apply to non-EU member states like Norway, they do represent an approach that could *prima facie* be presumed to be consistent with the Bern Convention as the EU and its member states are parties to the Convention, and the Habitats Directive is expressly intended to implement the Convention within the EU (Epstein 2014). Furthermore, the vast majority of wolves within the Scandinavian population are within an EU member state, Sweden, such that it is important to understand practices in all parts of the population in order to assess cumulative effects. We will therefore make some reference to case law and guidance regarding the Habitats Directive.

However, it is important to apply restraint in the degree to which such case law and guidance under the Habitats Directive is considered indicative of the correct interpretation of the Bern Convention. This is so for the plain reason that the Bern Convention is the leading framework, higher up in the hierarchy than the Habitats Directive. Thus, the Directive must conform to the Convention, not the other way around. This effectively precludes the Directive's regime from providing EU member states with broader possibilities for killing strictly protected Bern Convention species than the Convention itself provides. Conversely, it *is* possible for the Directive to be more restrictive in this regard, and indeed Article 12 of the Convention expressly allows this. However, to what extent the Directive in fact imposes further constraints on national authorities for the killing of wolves and similar species than the Convention does is not a question we aspire to answer in this article (but see, e.g., Darpö and Epstein 2017).

Does the Bern Convention seek to conserve wildlife populations or to protect individual animals from being killed?

There are many different visions of nature conservation (Linnell et al. 2015; Mace 2014). A fundamental aspect of our discussion concerns determining if the Bern Convention seeks to conserve wildlife populations using protection as a context-dependent tool, or if the protection of individuals from anthropogenic mortality is an explicit objective in itself. Our view is that the Convention definitely reflects the former approach, i.e. aiming at the conservation of populations, based on the following lines of evidence.

(1) Throughout the preamble and Articles 1-3 the Convention's text uses the word "conservation" to refer to goals. Explicitly, Article 2 refers to "…maintain the population of wild flora and fauna …".

(2) The fact that there are two different appendices for wildlife species, where Appendix III opens for exploitation, implies that the prevention of killing that is required for Appendix II species is a context-dependent measure appropriate for some species in some countries and necessary for their conservation, rather than an independent objective.

(3) The Convention applies to the entire European landscape, not just protected areas, which implies a recognition of the multi-use landscape in which European wildlife conservation occurs. This, in turn, automatically implies the need for pragmatic management and compromises, which is explicitly recognized in Article 2's text that

allows populations to be "adapted" to other considerations than ecological ones, and in the inclusion of Article 9 that opens for exceptions from Appendix II's prohibition on killing. The Bern Convention was apparently intended by its drafters as "an instrument that would permit flexibility of action within a common purpose" (Explanatory Report, para. 10), and the possibility of derogations from strict protection in Article 9 clearly reflects this approach.

(4) The word "protection" is not used as an opposite to killing (as in the widespread modern sense of the meaning of the word protection). For example, Article 7 requires parties to "… ensure the protection of the wild fauna species …." but then goes on to permit the "…. exploitation of wild fauna ….". It is important to remember that the Convention was written in the 1970s before much of the present-day terminology of sustainable use, conservation biology, biodiversity and animal welfare had developed. In this period "protection" referred to the inclusion of wildlife within a legal framework that limited human actions because the default at the time was a lack of any legal status at all. In other words, protection referred to "inclusion in a legal framework" rather than "protect all individuals from deliberate killing".

(5) Animal welfare considerations are implicitly included via Appendix IV's listing of prohibited mechanisms of killing.

(6) Article 2 formulates the goals of the Convention and recognizes that the conservation goals for a species need to take into account a diversity of interests, including cultural, economic and recreational requirements, in addition to the ecological. This can be taken as explicit recognition of the need to find compromises between competing interests, even if Article 2 must clearly be interpreted as giving precedence to ecological considerations in cases of irreducible conflict (Trouwborst et al. 2017b). Two of the most relevant interests that potentially compete with the Convention's primary ecological imperative are hunting and livestock grazing. Hunting of wild ungulates is clearly a major source of income, cultural tradition and recreational value in rural Norway, as in most of Europe. Livestock grazing is also widespread and serves as both an economic activity in rural areas, and as a potentially important action required to maintain grazing dependent biodiversity and cultural landscapes (highlighted in the 2000 European Landscape Convention, for example). The semi-domestic reindeer herding conducted by the indigenous Sami people of central and northern Fennoscandia is clearly an important cultural activity, which is also protected by other conventions such as the 1989 Convention concerning Indigenous and Tribal Peoples in Independent Countries (ILO Convention No. 169), the Norwegian Nature Diversity Act of 2009 (section 1) and the Norwegian constitution (§ 108).

In summary, the Convention's objectives are evidently focused on the conservation of populations, whereby strict protection of individual animals is one means that may be needed to achieve this goal within certain contexts. However, it is important to underline that none of these arguments permit deviation from the obligation to work towards and ultimately ensure a population level conforming to the requirements of Article 2 of the Convention.

The role of cultural requirements within the scheme of the Convention

Building on our prior analysis of Article 2 (Trouwborst et al. 2017b), it is appropriate in the present context to dwell on the reference this provision makes to "cultural requirements". In particular, Article 2 obliges Bern Convention parties to "take requisite measures to maintain the population of wild flora and fauna at, or adapt it to, a level which corresponds in particular to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements and the needs of sub-species, varieties or forms at risk locally." The reference to cultural requirements is somewhat enigmatic. As Bowman et al. (2010: 300) note, "it would certainly be difficult to [define a population level] by reference to cultural considerations." However, the insertion of the word "cultural" must have happened for a reason, and it seems reasonable to assume, therefore, that cultural requirements such as preservation of local ways of (human) life could exert an influence on the population level required by Article 2, both upwards and downwards, depending on the circumstances. Nevertheless, it would *not* be reasonable to assume that cultural considerations could justify a population level that is so low that the population is actually threatened. In other words, ecological requirements would appear to impose an absolute minimum, the breaching of which cannot be justified by cultural requirements or otherwise. Where precisely *above* this absolute minimum parties should aim the population level to be, would appear to be the result of a balancing of ecological, scientific and cultural requirements, and to a lesser extent economic and recreational requirements as well.

The existence of the aforementioned minimum population level – where ecological requirements would trump cultural requirements besides economic and recreational ones (Bowman et al. 2010; Trouwborst et al. 2017b) in case of conflict – follows *inter alia* from the Convention's objective as formulated in Article 1, which makes clear that the *exclusive* aim of the Convention is wildlife conservation, not conservation of human cultures or economies. That Article 2 should logically be interpreted in light of this objective as formulated in Article 1 is further reinforced by the Explanatory Report to the Convention, which succinctly states (in para. 21) that Article 2 "contains a main obligation that follows from the aims stated in Article 1, paragraph 1." An interpretation whereby cultural requirements would be presented as justifying a population level at which the population is actually threatened is thus simply untenable in light of the basic rules of treaty interpretation. The separate minimum requirements of the "survival of the population" set out in Article 9 and keeping "populations out of danger" set out in Article 7 would also independently prevent "cultural requirements" from justifying policy targets set at a level where the population would be threatened.

As we acknowledged earlier (Trouwborst et al. 2017b), where the aforementioned absolute minimum population level required by Article 2 lies precisely is difficult to pinpoint. There are, however, certain indicators of potential utility. In Norway, for instance, once wolves are no longer listed as threatened on the national Red List, that

would appear to provide the authorities with an argument to say that the population of wolves in Norway corresponds to ecological requirements as demanded by Article 2. The same could probably be said if wolves in Norway can be shown to be at a "favourable conservation status" as defined under the Habitats Directive.

Exploring the legality of lethal control

Article 9 of the Bern Convention outlines the conditions under which exceptions from the provisions of Articles 4, 5, 6, 7 and 8 can be granted. (It should be noted that exceptions may *not* be made to the general obligation in Article 2 to secure a particular population level for all wildlife.) Article 9 sets two preconditions before any exception to the prohibition on killing strictly protected wolves can be granted. These are "that there is no other satisfactory solution" and "that the exception will not be detrimental to the survival of the population concerned". If these preconditions are met there are five reasons identified that may justify an exception, four of which are relevant for our discussion. These are:

9.1.i - "for the protection of flora and fauna",
9.1.ii - "to prevent serious damage to crops, livestock, forests, fisheries, water and other forms of property",
9.1.iii - "in the interests of public health and safety, air safety or other overriding public interests",
9.1.iv - "for the purposes of research and education, of repopulation, of reintroduction and for the necessary breeding",
9.1.v - "to permit, under strictly supervised conditions, on a selective basis and to a limited extent, the taking, keeping or other judicious exploitation of certain wild animals and plants in small numbers".

An important question concerns the burden of proof. The general assumption here is that the contracting party involved must be able to adequately justify the exceptions it allows or makes by demonstrating that all three conditions of Article 9 are met. As one Bern Convention guidance document (T-PVS/Inf (2010) 16) puts it: "Competent authorities need to explain the particular circumstances justifying the choice of an Article 9.1 reason and verify that the specific conditions are met." There is currently a general lack of documentation about the utility of many lethal and non-lethal approaches to interventions aimed at the relatively simple conflict associated with livestock depredation (Eklund et al. 2017; Treves et al. 2016), let alone the more complex social/cultural conflicts (Reed 2008; Sandström et al. 2009). However, providing evidence that allowing more liberal killing of wolves helps to increase tolerance requires that it is actually tested and evaluated, so there can be a catch-22 situation where proof is needed, but cannot be obtained until tested.

Condition #1: No satisfactory alternatives

Regarding the condition that derogations may only be authorized when "there is no other satisfactory solution", the Appendix to Resolution No. 2 holds that the authorities should "choose, among possible alternatives, the most appropriate one that will have the least adverse effects on the species while solving the problem," while adding that the reasoning backing the choice made should be "objective and verifiable". Regarding the prevention of damage to livestock or other property, "less oppressive measures" can be considered as an alternative solution to killing.

When discussing the satisfactory alternatives test, the European Commission's guidance regarding the Habitats Directive emphasizes that "recourse to Article 16 derogations must be a last resort" (European Commission 2007, para. 38, emphasis in original). It is furthermore observed that:

"The appraisal of whether an alternative is satisfactory or not, in a given situation, must be founded on objectively verifiable factors, such as scientific and technical considerations. In addition, the solution finally selected, even if it involves a derogation, must be objectively limited to the extent necessary to resolve the specific problem or situation. Evidently, the requirement to consider seriously other alternatives is of primary importance. The discretionary power of Member States is limited, and where another solution exists, any arguments that it is not 'satisfactory' will need to be convincing. Moreover, it should be stressed that another solution cannot be deemed unsatisfactory merely because it would cause greater inconvenience to or compel a change in behavior by the beneficiaries of the derogation." (European Commission 2007, paras. 40-41)

The assessment whether there exists any "other satisfactory solution" should be context-dependent and involve a confrontation of the measure reviewed (e.g. hunting) with the alternative measures so as to be certain that the restrictions imposed are justified. This amounts to a proportionality test: a) is the alternative effective, and b) can the alternative achieve the same end in a way that is less harmful to the carnivore's population?

There is considerable experience across Europe when it concerns protecting domestic livestock from large carnivore depredation (Breitenmoser et al. 2005; Linnell et al. 2012). A range of measures including electric fencing and intensive shepherding, both of which can also involve livestock guarding dogs, exist that can greatly reduce losses. However, the introduction of these measures can be very expensive and be associated with logistical challenges, certainly under Norwegian conditions (poor quality of grazing pastures, land-ownership patterns, high labour costs, and restrictive labour laws). The question then arises to what extent it is expected that Norway adapt a nationwide practice to accommodate wolves or how quickly this transition should occur? Norwegian wolf policy documents have been evolving since the 1980s. Throughout the late 1980s and 1990s it was already clear to policy makers that the areas along the border with Sweden would be the most likely to house a future wolf population (this was formally designated as a "wolf zone" in 2001) and also that dramatic changes to livestock husbandry would be needed (Miljøverndepartementet 1992, 1997, 2003).

Therefore, there has been over 30 years of awareness of the issue in the area within and surrounding the current wolf zone. For semi-domestic reindeer, the situation is somewhat different as there are virtually no practical protective measures that can be adopted to hinder serious depredation by wolves, although compensation does exist to mitigate the economic losses.

In contrast, there is much less experience when it comes to demonstrating what works and what does not work to reduce social and perceptional conflicts. There is considerable practical experience with stakeholder processes (Reed 2008) and various forms of inclusive management in Europe (Sandström et al. 2009; Redpath et al. 2017). However, although inclusive management may be intrinsically important to satisfy modern day democratic principles and to address a sense of justice (Jacobsen and Linnell 2016) it is unclear if it alone can diffuse such complex conflicts as those associated with large carnivores. Information is often touted as a solution to some social conflicts, but again there are doubts concerning the extent to which it alone can address these wolf conflicts (Ericsson and Heberlein 2003). When considering how any measures might be successful in diffusing these conflicts it is crucial to consider how a package of multiple measures will come to bear on multiple conflict dimensions. This makes the task of documenting effects challenging, an issue made worse by the long memory of many of the parties in the conflict, such that any new measures will still be interpreted in light of perceived shortcomings of previous strategies. In conclusion, it will be highly challenging to document, or reject, the utility of any single measure used to address social and perceptional conflicts.

Condition #2: No detrimental effect on the population

With regard to the condition in Article 9 that a derogation must not be "detrimental to the survival of the population concerned," according to the Appendix to Resolution No. 2 the assessment whether this is so "should be based on current data on the state of the population, including its size, distribution [and] future prospects." It is also made clear that account must be taken of "cumulative effects of several derogations," and that "special caution should be taken in case of species that are not in 'favourable' conservation status." There are four issues here relevant for the current discussion. The first concerns the number of animals to be killed relative to the size of the population. The smaller the proportion of the population to be killed, the more likely it is to be legally acceptable. Secondly, the implications of this depend very much on the scale of assessment, i.e. if we view the population as the wolves present in Norway, those present in Scandinavia, or those present in Fennoscandia and western Russia. The key biological issue here is that killing individuals in a small unit will always have greater uncertainties attached to it than the same actions in large units because the role of chance events is automatically greater in small units. Thirdly, there is a need to consider all mortality within the unit of assessment. If the assessment refers to the Scandinavian population, then it would imply a need for a formal coordination of planned mortality in both Norway and Sweden. No such coordination exists. Furthermore, the

Bern Convention's Standing Committee has recommended a set of guidelines on population level management of large carnivores (Linnell et al. 2008) to parties (Recommendation No. 137 (2008)) where a central tenet is that the use of the transboundary population level as the benchmark for assessments in connection with Article 9 should only be considered when formal management plans exist at the transboundary population level (Trouwborst et al. 2017a and 2017b). Finally, irrespective of the scale of assessments, all parties to the Convention have individual responsibilities towards species conservation and cannot outsource these to other countries (Trouwborst et al. 2017b). In the current Norwegian context with its small population, the condition of no detrimental effect is evidently a high hurdle.

Serious damage

Insofar as the purpose of a derogation is "to prevent serious damage", the interpretive guidance in the Appendix to Resolution No. 2 provides the following:

"If 'damage' is taken to mean prejudice sustained by a person as a result of damage caused to those items of property that are listed in Article 9, paragraph 1, second subparagraph, and it seems legitimate to do so, then the adjective 'serious' must be evaluated in terms of the intensity and duration of the prejudicial action, the direct or indirect links between that action and the results, and the scale of the destruction or deterioration committed. 'Serious' does not, of course, necessarily mean that the damage was widespread: in some cases the item of property affected may cover only a limited geographical area (for example, a region), or even a particular farm or group of farms. However, the exceptions should be proportional to the damage suffered: the fact that an isolated farm sustains damage would not appear to justify the capture or killing of a species over a very wide area, unless there is evidence that the damage could extend to other areas. It is not required that the damage be already present. Rather, it is sufficient if serious damage in all likelihood will occur."

The exception is limited to property, which in a Norwegian context would automatically include livestock, semi-domestic reindeer, dogs, beehives etc. The extent to which it can be extended to game populations has frequently been raised in policy debates and there is still some perceived uncertainty, as it depends if one refers to the game itself (not property) or the hunting rights (linked to property rights).

Overriding public interest

Regarding the meaning of the term "overriding public interest", it would seem on the one hand that the Norwegian authorities have quite some discretion to determine themselves what they consider the term to cover. As Bowman et al. (2010: 318) put it, "the phrase 'other overriding public interests' appears to give the parties a disturbingly wide margin of discretion." On the other hand, invoking this clause is certainly not a purely *pro forma* matter either, and indeed the Appendix to Resolution No. 2 considers the interpretation of the words "overriding public interest" to constitute "a very difficult problem". Nor-

way would be expected, when invoking it, to muster an adequate measure of concrete justification of the "public" and "overriding" nature of the issue. The latter term requires argumentation that the conflict reduction interest in which wolves are to be culled "overrides" the conservation utility of upholding the prohibition on killing them – a determination to be made in good faith and in light of the Bern Convention's objectives. The Appendix to Resolution No. 2 takes the position that if push comes to shove it is up to the Standing Committee to determine whether an interest advanced by a certain party as an "overriding public interest" must indeed be considered to qualify as such, and that "in the event of difficulties" (i.e., disagreement between parties in this regard), the matter could be referred under Article 18 to an arbitral tribunal for definitive settlement. In light of the above, it would seem that protecting the aforementioned rural interests could in theory be construed as a matter of "overriding public interest" – especially in light of the fact that Norway has an active rural policy enshrined in policy and legislation. However, any explanation furnished by the Norwegian authorities must be persuasive. Whether killing wolves is then the best or only viable means to serve such supposed overriding rural interests will be the subject of the alternatives test discussed above.

Public safety

The Explanatory Report clarifies that killing individual large carnivores should not be problematic in situations where public safety is at real and imminent risk. The Explanatory Report, para. 39 states that "there might be emergency cases where exceptions would have to be made without all conditions [of Article 9] having been fulfilled (e.g. the abatement of rabies)". Furthermore, paragraph 31 states that the prohibitions of Article 6(a)-(c) do not apply in situations of self-defence: "It was not thought necessary to specify explicitly that the provisions under a, b and c would not apply in case of self-defence".

Judicious use

Regarding the 'judicious use' clause from Article 9 ("to permit, under strictly supervised conditions, [etc]"), the accompanying conditions are procedural rather than substantive in the sense that, as the Appendix to Resolution No. 2 states, this ground may be invoked by a contracting party "for any reason which to it seems valid (for instance, hunting, recreation, etc)," although the party should "ensure that such reason is clearly identified." The Appendix also states that a derogation based on the judicious use clause "should be temporary but may be renewed from time to time." Generally, the scope this clause offers for justifying wolf culling appears to be tightly related to the overall number of wolves in Norway, as the overall status and trend of the wolf population would heavily influence the interpretation of what is "judicious" and what are "small numbers". As the Appendix to Resolution No. 2 puts it, "the expression

'small numbers' should thus be construed in the light of the state of the conservation of the population." To illustrate, killing 20 out of a total of 60 wolves would hardly qualify as "small numbers", but killing the same 20 wolves out of a total population of 2000 wolves may very well do. Thus, in Norway, the current small wolf population and minimalist population target would seem to preclude a meaningful role for the judicious use clause in the foreseeable future.

It should be noted, moreover, that according to the interpretive guidance in the Appendix to Resolution No. 2, the wording "under strictly supervised conditions" should be understood to mean that "the authority granting the exception must possess the necessary means for checking on such exceptions either beforehand (e.g., a system of individual authorisations) or afterwards (e.g., effective on-the-spot supervision), or also combining the two possibilities." In addition, the expression "to a limited extent" suggests, again in the words of the Appendix, that the authorized measures should be "limited in both space and time."

Norway, together with Sweden, has invested in what are probably the world's most intensive monitoring programs for large carnivores (http://www.rovdata.no). When it concerns wolves, this includes annual counts of numbers of packs and reproductions, an overview of the location of non-breeding, but territorial, pairs, and an assessment of genetic identity that for most individuals extends to knowledge of their full pedigree and inbreeding coefficients (e.g. Bensch et al. 2006). Effective wildlife management institutions are in place to set and monitor quotas as well as regulate the number of hunters allowed to engage in lethal control and hunting. Although the meaning of "selective basis" seems to mainly apply to ensuring that only the right species is killed (Shine 2010), the management institutions in place have no problem in focusing the killing of wolves on specific packs and regions. There are no obvious reasons why this form of controlled hunting could not be done by rural hunters as opposed to state agents, and indeed most of the proposed benefits of hunting will only be achieved by allowing rural hunters to conduct the activity.

Interestingly, Norway did not include this judicious use clause (Bern Article 9.1.v) in its 2009 Nature Diversity Act which otherwise included the other clauses. An attempt to modify the Nature Diversity Act accordingly in spring 2017 failed. However, our discussion of this clause is still important in case of future changes to the law, and for the more general value of this discussion for other Bern Convention countries.

Ending suffering

According to the Explanatory Report, para. 39: "It was considered that the taking or killing of protected fauna for humane or humanitarian reasons was an accepted practice that did not require a specific provision in the Convention." This would presumably apply to a wolf badly injured through accidental collision with a vehicle, for example. This is also supported by paragraph 4 "Duty to help" of Norway's Animal Welfare Act of 2009.

Guidance from the Habitats Directive

Substantively, the Habitats Directive has copied the structure of the Bern Convention. In both instruments the wolf is listed as a strictly protected species and is protected in a similar way (although many countries also registered exceptions for wolves). As in the Bern Convention, the system of strict protection must include the prohibition of the "deliberate capture or killing of these species" (Habitats Directive, Article 12). Also comparable to the Convention, exceptions to this strict protection regime may be justified when one of the five grounds occurs, when there is "no satisfactory alternative", and such an exception would not be detrimental to the maintenance of the populations of the species concerned at a favorable conservation status in their natural range (Article 16.1).

The 2007 Finnish wolf case, in which the CJEU ruled on the compatibility of lethal control of wolves with their conservation, could be helpful when interpreting Norway's obligations under article 9 of the Bern Convention. The case concerned 22 Finnish hunting permits that allowed the killing of individual wolves in order to prevent serious damage to livestock and dogs. This ground for derogation is listed under article 16.1 of the Habitats Directive, and mirrors one of the grounds for derogation under the Bern Convention. The Commission brought an infraction action against Finland claiming that since (i) the conservation status of the wolf was not favourable in Finland, (ii) alternative approaches could be employed and (iii) hunting permits were issued without establishing that these particular wolves caused serious damage, the authorization to hunt wolves did not satisfy the conditions laid down in Article 16.1 of the Habitats Directive (Case C-342/05, Commission v Finland).

The Court reiterated that the favourable conservation status of the populations of the species concerned in their natural range is a necessary precondition for the derogations to be granted. Nevertheless, it held that the granting of such derogations remains possible by way of exception if they do not worsen the unfavourable conservation status of those populations or prevent their restoration at a favourable conservation status. Thus, if the killing of a limited number of wolves has no effect on the objective of maintaining the population at a favourable conservation status in its natural range, such killing may be allowed. In any event, such a decision has to be aimed at animals likely to cause damage, be based on an assessment of the effect of the killing on the maintenance at a favourable conservation status of the population, and should contain a clear and sufficient statement of reasons as to the absence of a satisfactory alternative.

Regarding the complaint by the Commission that hunting permits were issued on a preventive basis or without any relationship with the particular wolves causing serious damage the CJEU observed that Article 16.1 of the Habitats Directive does not require serious damage to be sustained before derogating measures can be adopted. The Court, however, did not define what constitutes "serious damage" or to what extent wolf culling on a preventive basis is allowed (e.g. to improve social tolerance for species), but it did point out that there was little biological research available on the question of whether continued hunting keeps wolves wary of humans and thus helps to reduce damage. It concluded therefore that "in those circumstances, the Commission's complaint relat-

ing to the fact that hunting permits are issued on a preventive basis must be upheld" (Case C-342/05). As the Court concluded, by authorising wolf hunting on a preventive basis, without it being established that the hunting is such as to prevent serious damage, Finland has failed to fulfill its obligations under the Directive (Epstein 2017).

Conclusions

The Convention's objectives

The sole overarching objective of the Bern Convention is nature conservation. The arena for conservation in which the Bern Convention was crafted to operate, however, is the entire multi-use and human-dominated of landscape of Europe, not just the protected areas. Besides ecological requirements, the Convention therefore also caters for the incorporation of economic and cultural requirements. As long as the paramount minimum requirements regarding species' conservation status are met, the Convention provides room for flexibility, exceptions, and necessary management actions.

Furthermore, our analysis confirms that the Bern Convention is intended to promote the conservation of wildlife populations rather than prevent the killing of individual animals *as such*. Avoiding the deliberate killing of animals was included as a context dependent measure to bring about these goals when needed. A problem is that there is an apparent lack of consistency concerning which countries opted for reservations for Appendix II designation of wolves and the present status of their wolf populations. Furthermore, the existing mechanism (Article 17) to permit the adjustment of Appendix designation in response to the success or failure of conservation measures over time has not been utilised very often, and the dozen occasions on which the appendices have been amended all involved the addition of new species. Considering that more than 37 years have passed since the Convention was drafted and the appendices drawn up it is not surprising that there are now some questions about the extent to which they match the conservation status of certain species on the ground, particularly where conservation status has markedly improved. It should be noted that this issue clearly does not apply to Norway and its critically endangered wolf population.

Proportionality

In our view, the Convention provides for many options that allow for the killing of wolves (and other strictly protected species) for multiple legitimate reasons (Box 1). These can be interpreted as covering issues related to protecting property (like livestock), protecting human safety, and responding to a wide range of the other social conflicts associated with wolves. However, none of these allow deviation from the ob-

Box 1. Evaluating different situations.

Based on our exploration of the potential motivations to deviate from the prohibition on "deliberate killing" for Appendix II species there are five broad scenarios under which exceptions are likely to be sought. Here we try to summarise to what extent they are likely to be acceptable in terms of one (or more) of the reasons for derogating from strict protection mentioned in Article 9.1 of the Bern Convention. The codes in parentheses refer to the clauses in Article 9.1, in decreasing order of applicability. It is important to note that in all cases there is also a need to verify and document that no satisfactory alternatives exist, that the cumulative exceptions will not jeoparadise the population (Article 9), and that the overall conservation obligation (outlined in Article 2) is met.

Scenario 1: Humanely ending the life of a large carnivore suffering from injury or disease from which it cannot recover.
- Should be unproblematic (Explanatory Report).

Scenario 2: Responding to a specific individual carnivore's damage to property, such as livestock or beehives.
- Should be unproblematic if a specific problem individual or pack can be identified *and* if the level of damage is serious *and* if best practice protective measures have been adequately utilized but proven ineffective (because no alternative livestock protection measures provide 100% protection, as some individual carnivores inevitably find a way past them) (Article 9.1.ii).

Scenario 3: Responding to a specific individual carnivore's potentially dangerous behavior with respect to humans.
- Should be unproblematic if an individual (or social group) has attacked people, or has shown unquestionably threatening behavior, or has a dangerous disease such as rabies (Explanatory Report and Article 9.1.iii).
- The challenge is to identify objective criteria to assess the potential risk from different behaviours in the absence of direct attacks or unambiguous threats. The knowledge of risk factors associated with wolf behavior lags far behind that for bears, requiring the development of guidelines based on best available knowledge. A second requirement is to effectively link allowing killing of individuals to the reduction of risk.

Scenario 4: Lethal control to limit a population's growth and distribution, or slow its growth rate so as to permit time for human adaptation (i.e., gradual adoption of alternative measures).
- Easier to argue for semi-domestic reindeer than for sheep because suitable alternatives exist for sheep, but not for reindeer, and the cultural aspects of reindeer herding are more easily identified within legal frames. For sheep husbandry, the question concerns over how wide an area, and how quickly, these alternative forms of husbandry should be introduced. (Article 9.1.ii, 9.1.iii). This is also linked to the discussion of the level of ambition of conservation goals (Trouwborst et al. 2017b).
- Can potentially be used to limit predator impact on wild game of importance to hunters (Article 9.1.ii, 9.1.iii) if hunting is identified as an issue of overriding public interest or if game harvesting is included as a form of property right.

Scenario 5: Permit a sustainable harvest of a population to reduce social conflicts and promote tolerance among rural residents.
- Not automatically acceptable, but could potentially be argued in relation to a broad set of arguments linked to maintaining rural lifestyle and addressing social conflicts such as empowerment or recognition of multiple values, as well as economic issues where losses occur. This would be especially true if it can be shown that conflicts are related to carnivore population density which is certainly probable for conflicts with hunting interests and with livestock in some cases (Article 9.1.v, 9.1.iii, 9.1.ii, 9.1.i).

ligation to make a real commitment to the conservation of the species in question by ensuring a population level that "corresponds to [*inter alia*] ecological requirements," as demanded by Article 2 of the Convention (Trouwborst et al. 2015a, 2017b). Also, the requirement that alternatives to killing be identified – and, where available, used instead of killing – is paramount, as is the need to ensure that the cumulative effect of all actions does not jeopardize the survival of the population.

There is also the clear need for a degree of proportionality. The numbers being killed, and the threshold below which animals cannot be killed must be seen in relation to both the degree of conflict and the size of the population. It would therefore be easier for Norway, for example, to justify a more liberal wolf killing policy if the wolf population were to have a more favourable conservation status. The larger the wolf population, the more management flexibility the Convention allows. Although the Convention does not directly state how many wolves a country needs to have at a minimum, it is unlikely that maintaining a population in a permanent state of "critically endangered" (its current status on national red lists) satisfies its obligations (Trouwborst et al. 2017b).

The need to document reasoning and utility

There is also an evident need to robustly and openly document the reasoning and utility behind granting exceptions (Box 1). The current Norwegian policy documents (Klima og Miljødepartement 2016) focus very heavily on killing wolves as a means of protecting livestock. However, at least for domestic sheep, this is the one conflict for which there are a whole suite of alternative measures that can be used to prevent conflict. Furthermore, at present the extent of conflicts with livestock within the existing wolf zone is also minimal (Strand 2016; Krange et al. 2016) such that this argumentation is only really relevant for areas outside the zone. In other words, if Norway is to justify a more liberal use of exceptions to kill wolves within the wolf zone it should make the arguments associated with considering other conflicts much more explicitly. This requires an open debate about to what extent it is viewed as principally acceptable to kill wolves to manage perceptions of conflict rather than the material and economic dimensions (e.g. Ericsson et al. 2004) of conflict, and the documentation of the potential utility of this approach. This, in turn, would require a formal acceptance of the legitimacy of invoking the reduction of perceptional and social conflicts as grounds for exceptions (Linnell 2013). This question has both legal (with respect to national and international instruments) and social (public opinion within Norway) dimensions. It is of interest that the Swedish Supreme Administrative Court ruled in favour of recognizing these issues with respect to interpretation of derogations under the Habitats Directive (judgement on 30th December 2016, cases 2406–2408-16 / 2628–2630-16).

Which public?

These other conflicts are much less associated with economic losses and more linked to perceptions, being based on the idea of "tolerance hunting" (Epstein 2017). While the motivation for this has been well documented among many rural stakeholders it is likely to

be highly controversial with other sectors of society. It is well known that public tolerance for hunting is linked to the motivations for hunting (Kaltenborn and Brainerd 2016). For example, hunting for meat is often more tolerated than hunting for trophies. Hunting for tolerance is likely to be especially controversial. This implies that it becomes a question of which public interests should be prioritized? Those of certain rural stakeholders or those of a wider society (both rural and urban)? This has been a central part of ongoing controversies in North American wolf management (Treves et al. 2017; Vucetich et al. 2017) and has also become apparent in Norway in recent months. It is, however, important to not confound the desire to kill wolves with an automatic anti-wolf stance (Kaltenborn et al. 2013a.b). Here we note, but do not ourselves address, the ongoing and as yet undecided debate over the compatibility of tolerance hunting with the derogation clause in Article 16 of the Habitats Directive. Whereas the Swedish Supreme Administrative Court, in the aforementioned ruling, accepted hunting as a legally viable option to increase social tolerance of wolves, Epstein (2017) has pointed out that in the absence of clear evidence that allowing hunting indeed delivers wolf conservation results, the CJEU is likely to "interpret the Habitats Directive to prohibit tolerance hunting." Given the Court's prior case law Epstein's prediction may well be correct, but for present purposes we recall that the interpretation of the Bern Convention is not directly affected by this EU case law.

While there are many good arguments for being responsive to the concerns of rural stakeholders who are being asked to share their properties, neighbourhoods, and landscapes with wolves (Redpath et al. 2017) it is essential that management explicitly addresses the question of how they are balancing the concerns of the different publics within the intentions, constraints and obligations imposed by the Convention. The current Norwegian policy, which aims to have high rates of wolf killing and minimal population goals, can hardly be viewed as a reasonable attempt at balancing these interests, and certainly not as living up to the country's obligations under the Bern Convention. As the conflict is presently playing out it is becoming increasingly clear that the main limitation to the flexibility of Norway's wolf management is not with the Convention's strict protection designation, but with the polarized domestic public opinion concerning the moral acceptability of different motivations for killing wolves, and especially with parliament's attempts to set minimal population goals that do not conform to the requirements of Article 2 of the Convention (Trouwborst et al. 2017b).

Strict on goals, flexible on means

Overall, for Bern Convention parties in general and for Norway in particular, the aggregate outcome of our current analysis and our prior analysis of Article 2 (Trouwborst et al. 2017b) underscores that being ambitious and strict on population targets and flexible and pragmatic on the way to achieve them may well be the best way forward for large carnivore conservation and management in the human-dominated landscapes of Europe.

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References

Andersen R, Linnell JDC, Hustad H, Brainerd S (2004) Large carnivores and human communities: a guide to coexistence in the 21st century. Norwegian Institute for Nature Research Temahefte 25: 1–48.

Andersen R, Linnell JDC, Solberg EJ (2006) The future role of large carnivores on terrestrial trophic interactions: the northern temperate view. In: Danell K, Bergström R, Duncan P, Pastor J (Eds) Large herbivore ecology, ecosystem dynamics and conservation. Cambridge University Press, Cambridge, 413–448. https://doi.org/10.1017/CBO9780511617461.016

Bautista C, Naves J, Revilla E, Fernández N, Albrecht J, Scharf AK, Rigg R, Karamanlidis AA, Jerina K, Huber D, Palazón S, Kont R, Ciucci P, Groff C, Dutsov A, Seijas J, Quenette PY, Olszańska A, Shkvyria M, Adamec M, Ozolins J, Jonozovič M, Selva N (2017) Patterns and correlates of claims for brown bear damage on a continental scale. Journal of Applied Ecology 54: 282–292. https://doi.org/10.1111/1365-2664.12708

Bensch S, Andrén H, Hansson B, Pedersen HC, Sand H, Sejberg D, Wabakken P, Åkersson M, Liberg O (2006) Selection for heterozygosity gives hope to a wild population of inbred wolves. Plos One 1: e72. https://doi.org/10.1371/journal.pone.0000072

Bisi J, Kurki S, Svensberg M, Liukkonen T (2007) Human dimensions of wolf (Canis lupus) conflicts in Finland. European Journal of Wildlife Research 53: 304–314. https://doi.org/10.1007/s10344-007-0092-4

Boitani L, Linnell JDC (2015) Bring large mammals back: large carnivores in Europe. In: Pereira HM, Navarro LM (Eds) Rewilding European Landscapes. Springer, Berlin, 67–84.

Borg BL, Arthur SM, Bromen NA, Cassidy KA, McIntyre R, Smith DW, Prugh LR (2016) Implications of Harvest on the Boundaries of Protected Areas for Large Carnivore Viewing Opportunities. Plos One 11. https://doi.org/10.1371/journal.pone.0153808

Bowman M, Davies P, Redgwell C (2010) Lyster's International Wildlife Law, 2nd ed. Cambridge University Press, Cambridge. https://doi.org/10.1017/CBO9780511975301

Breitenmoser U, Angst C, Landry JM, Breitenmoser-Würsten C, Linnell JDC, Weber JM (2005) Non-lethal techniques for reducing depredation. In: Woodroffe R, Thirgood S, Rabinowitz A (Eds) People and wildlife: conflict or coexistence? Cambridge University Press, Cambridge, 49–71. https://doi.org/10.1017/CBO9780511614774.005

Butler JRA, Linnell JDC, Morrant D, Athreya V, Lescureux N, McKeown A (2014) Dog eat dog, cat eat dog: social-ecological dimensions and implications of dog predation by wild carnivores. In: Gompper M (Ed.) Free-ranging dogs and wildlife conservation. Oxford University Press, Oxford, 117–143.

Carter NH, Linnell JDC (2016) Co-adaptation is key to coexisting with large carnivores. Trends in Ecology and Evolution 31: 575–578. https://doi.org/10.1016/j.tree.2016.05.006

Chan KMA, Balvanera P, Benessaiah K, Chapman M, Diaz S, Gomez-Baggethun E, Gould R, Hannahs N, Jax K, Klain S, Luck GW, Martin-Lopez B, Muraca B, Norton B, Ott K, Pascual U, Satterfield T, Tadaki M, Taggart J, Turner N (2016) Why protect nature? Rethinking values and the environment. Proceedings of the National Academy of Sciences of the United States of America 113: 1462–1465. https://doi.org/10.1073/pnas.1525002113

Chapron G, Kaczensky P, Linnell JDC, von Arx M, Huber D, Andrén H, López-Bao JV, Adamec M, Álvares F, Anders O, Balčiauskas L, Balys V, Bedő P, Bego F, Blanco JC, Breitenmoser U, Brøseth H, Bufka L, Bunikyte R, Ciucci P, Dutsov A, Engleder T, Fuxjäger C, Groff C, Holmala K, Hoxha B, Iliopoulos Y, Ionescu O, Jeremić J, Jerina K, Kluth G, Knauer F, Kojola I, Kos I, Krofel M, Kubala J, Kunovac S, Kusak J, Kutal M, Liberg O, Majić A, Männil P, Manz R, Marboutin E, Marucco F, Melovski D, Mersini K, Mertzanis Y, Mysłajek RW, Nowak S, Odden J, Ozolins J, Palomero G, Paunović M, Persson J, Potočnik H, Quenette P-Y, Rauer G, Reinhardt I, Rigg R, Ryser A, Salvatori V, Skrbinšek T, Stojanov A, Swenson JE, Szemethy L, Trajçe A, Tsingarska-Sedefcheva E, Váňa M, Veeroja R, Wabakken P, Wölfl M, Wölfl S, Zimmermann F, Zlatanova D, Boitani L (2014) Recovery of large carnivores in Europe's modern human-dominated landscapes. Science 346: 1517–1519. https://doi.org/10.1126/science.1257553

Chapron G, Treves A (2016) Blood does not buy goodwill: allowing culling increases poaching of a large carnivore. Proceedings of the Royal Society B-Biological Sciences 283. https://doi.org/10.1098/rspb.2015.2939

Cromsigt J, Kuijper DPJ, Adam M, Beschta RL, Churski M, Eycott A, Kerley GIH, Mysterud A, Schmidt K, West K (2013) Hunting for fear: innovating management of human-wildlife conflicts. Journal of Applied Ecology 50: 544–549. https://doi.org/10.1111/1365-2664.12076

Darpö J, Epstein Y (2015) Under fire from all directions: Swedish wolf management hunting scrutinized by Brussels and at home. In: Born C et al. (Eds) The Habitats Directive in its EU environmental law context. Routledge, London, 348–372.

Eklund A et al. (2017) Limited evidence on the effectiveness of interventions to reduce livestock predation by large carnivores. Scientific Reports 7: 2097. https://doi.org/10.1038/s41598-017-02323-w

Epstein Y (2014) The Habitats Directive and Bern Convention: synergy and dysfunction in public international and EU law. Georgetown International Environmental Law Review 26: 139–173.

Epstein Y (2017) Killing wolves to save them? Legal responses to "tolerance" hunting in the European Union and United States. Review of European Community and International Environmental Law 26: in press. https://doi.org/10.1111/reel.12188

Ericsson G, Heberlein TA (2003) Attitudes of hunters, locals, and the general public in Sweden now that the wolves are back. Biological Conservation 111: 149–159. https://doi.org/10.1016/S0006-3207(02)00258-6

Ericsson G, Heberlein TA, Karlsson J, Bjärvall A, Lundvall A (2004) Support for hunting as a means of wolf Canis lupus population control in Sweden. Wildlife Biology 10: 260–276.

Fischer A, Sandström C, Delibes-Mateos M, Arroyo B, Tadie D, Randall D, Hailu F, Lowassa A, Msuha M, Kereži V, Reljić S, Linnell J, Majić A (2013) On the multifunctionality of hunting – an institutional analysis of eight cases from Europe and Africa. Journal of Environmental Planning and Management 56: 531–552. https://doi.org/10.1080/09640568.2012.689615

Fleurke FM, Trouwborst A (2014) European regional approaches to the transboundary conservation of biodiversity: the Bern Convention and the EU Birds and Habitats Directives. In: Kotze L, Marauhn T (Eds) Transboundary governance of biodiversity. Martinus Nijhoff Publishers, Leiden/Boston, 128–162.

Herfindal I, Linnell JDC, Moa PF, Odden J, Austmo LB, Andersen R (2005) Does recreational hunting of lynx reduce depredation losses of domestic sheep. Journal of Wildlife Management 69: 1034–1042. https://doi.org/10.2193/0022-541X(2005)069[1034:DRHOLR]2.0.CO;2

Hiedanpaa J (2013) Institutional Misfits: Law and Habits in Finnish Wolf Policy. Ecology and Society 18. https://doi.org/10.5751/es-05302-180124

Hiedanpaa J, Bromley DW (2013) The Stakeholder Game: Pleadings and Reasons in Environmental Policy. Journal of Speculative Philosophy 27: 425–441. https://doi.org/10.5325/jspecphil.27.4.0425

Hiedanpää J, Bromley DW (2011) The harmonization game: reasons and rules in European biodiversity policy. Environmental Policy and Governance 21: 99–111. https://doi.org/10.1002/eet.561

Huber J, Von Arx M, Bürki R, Manz R, Breitenmoser U (2016) Wolves living in proximity to humans. KORA Bericht Nr 76: 1–19. https://doi.org/10.1016/j.biocon.2016.08.041

Jacobsen KS, Linnell JDC (2016) Perceptions of environmental justice and the conflict surrounding large carnivore management in Norway - Implications for conflict management. Biological Conservation 203: 197–206. https://doi.org/10.1016/j.biocon.2016.08.041

Kaltenborn B, Brainerd SM (2016) Can poaching inadvertently contribute to increased public acceptance of wolves in Scandinavia. European Journal of Wildlife Research 62: 179–188. https://doi.org/10.1007/s10344-016-0991-3

Kaltenborn BP, Andersen O, Linnell JDC (2013a) Predators, stewards, or sportsmen – how do Norwegian hunters perceive their role in carnivore management? International Journal of Biodiversity Science, Ecosystem Services and Management 9: 239–248.

Kaltenborn BP, Andersen O, Linnell JDC (2013b) Is hunting large carnivores different from hunting ungulates? Some judgments made by Norwegian hunters. Journal for Nature Conservation 21: 326–333. https://doi.org/10.1016/j.jnc.2013.05.004

Klima og Miljødepartement (2016) Ulv i norsk natur: bestandsmål for ulv og ulvesone. Klima og Miljødepartement, Oslo, Norway, 132 pp.

Knott EJ, Bunnefeld N, Huber D, Reljic S, Kereži V, Milner-Gulland EJ (2014) The potential impacts of changes in bear hunting policy for hunting organisations in Croatia. European Journal of Wildlife Research 60: 85–97. https://doi.org/10.1007/s10344-013-0754-3

Kojola I, Ronkainen S, Hakala A, Heikkinen S, Kokko S (2004) Interactions between wolves Canis lupus and dogs C. familiaris in Finland. Wildlife Biology 10: 101–106.

Krange O, Odden J, Skogen K, Linnell JDC, Stokland HB, Vang S, Mattisson J (2016) Evaluering av regional rovviltforvaltning. NINA Rapport 1268, 194 pp.

Linnell JDC (2013) From conflict to coexistence: insights from multi-disciplinary research into the relationships between people, large carnivores and institutions. Istituto di Ecologia Applicata, Rome.

Linnell JDC, Alleau J (2015) Predators that kill humans: myth, reality, context and the politics of wolf attacks on people. In: Angelici FM (Ed.) Problematic wildlife - a cross-dispclinary approach. Springer, Berlin, 357–372.

Linnell JDC, Aanes R, Swenson JE, Odden J, Smith ME (1997) Translocation of carnivores as a method for managing problem animals: a review. Biodiversity and Conservation 6: 1245–1257. https://doi.org/10.1023/B:BIOC.0000034011.05412.cd

Linnell JDC, Boitani L (2012) Building biological realism into wolf management policy: the development of the population approach in Europe. Hystrix - Italian Journal of Mammalogy 23: 80–91.

Linnell JDC, Breitenmoser U, Breitenmoser-Würsten C, Odden J, von Arx M (2009) Recovery of Eurasian lynx in Europe: what part has reintroduction played? In: Hayward MW, Somers MJ (Eds) Reintroduction of top-order predators. Wiley-Blackwell, Oxford, 72–91. https://doi.org/10.1002/9781444312034.ch4

Linnell JDC, Brøseth H, Odden J, Nilsen EB (2010) Sustainably harvesting a large carnivore? Development of Eurasian lynx populations in Norway during 160 years of shifting policy. Environmental Management 45: 1142–1154. https://doi.org/10.1007/s00267-010-9455-9

Linnell JDC, Kaczensky P, Wotschikowsky U, Lescureux N, Boitani L (2015) Framing the relationship between people and nature in the context of European nature conservation. Conservation Biology 29: 978–985. https://doi.org/10.1111/cobi.12534

Linnell JDC, Odden J, Mertens A (2012) Mitigation methods for conflicts associated with carnivore depredation on livestock. In: Boitani L, Powell RA (Eds) Carnivore ecology and conservation: a handbook of techniques. Oxford University Press, Oxford, 314–332. https://doi.org/10.1093/acprof:oso/9780199558520.003.0014

Linnell JDC, Odden J, Smith ME, Aanes R, Swenson JE (1999) Large carnivores that kill livestock: do "problem individuals" really exist? Wildlife Society Bulletin 27: 698–705.

Linnell JDC, Salvatori V, Boitani L (2008) Guidelines for population level management plans for large carnivores in Europe. A Large Carnivore Initiative for Europe report prepared for the European Commission (contract 070501/2005/424162/MAR/B2), 85 pp.

Linnell JDC, Zachos FE (2011) Status and distribution patterns of European ungulates: genetics, population history and conservation. In: Putman R, Apollonio M, Andersen R (Eds) Ungulate management in Europe: problems and practices. Cambridge University Press, Cambridge, 12–53. https://doi.org/10.1017/CBO9780511974137.003

Mabille G, Stien A, Tveraa T, Mysterud A, Broseth H, Linnell JDC (2015) Sheep farming and large carnivores: What are the factors influencing claimed losses? Ecosphere 6: Article 82. https://doi.org/10.1890/es14-00444.1

Mace GM (2014) Whose conservation? Science 345: 1558–1560. https://doi.org/10.1126/science.1254704

Madden F, McQuinn B (2014) Conservation's blind spot: the case for conflict transformation in wildlife conservation. Biological Conservation 178: 97–106. https://doi.org/10.1016/j.biocon.2014.07.015

Majic A, de Bodonia AMT, Huber D, Bunnefeld N (2011) Dynamics of public attitudes toward bears and the role of bear hunting in Croatia. Biological Conservation 144: 3018–3027. https://doi.org/10.1016/j.biocon.2011.09.005

Maser C, Polio CA (2012) Resolving environmental conflicts. CRC Press, London, 241 pp.

Miljøverndepartementet (1992) White paper on the management on bears, wolverine, wolf and lynx in Norway [Om forvaltning av bjørn, jerv, ulv og gaupe (Rovviltmeldingen)]. Stortingsmeldingen 27–1991–92: 54.

Miljøverndepartementet (1997) On large carnivore management [Om rovviltforvalting]. Stortingsmelding 35–1996–1997.

Miljøverndepartementet (2003) Carnivores in Norwegian nature [Rovvilt i norsk natur]. Stortingsmelding 15–2003–2004, 134.

Olson ER, Stenglein JL, Shelley V, Rissman AR, Browne-Nunez C, Voyles Z, Wydeven AP, Van Deelen T (2015) Pendulum swings in wolf management led to conflict, illegal Kills, and a legislated wolf hunt. Conservation Letters 8: 351–360. https://doi.org/10.1111/conl.12141

Penteriani V et al. (2016) "Human behaviour can trigger large carnivore attacks in developed countries." Scientific Reports 6. https://doi.org/10.1038/srep20552

Redpath S, Linnell JDC, Festa-Bianchet M, Boitani L, Bunnefeld N, Gutiérrez RJ, Irvine J, Johansson M, McMahon BJ, Pooley S, Sandstrom C, Sjölander-Lindqvist A, Skogen K, Swenson JE, Trouwborst A, Young J, Milner-Gulland EJ (2017) Don't forget to look down - collaborative approaches to predator conservation. Biological Reviews in press. https://doi.org/10.1111/brv.12326

Redpath SM, Young J, Evely A, Adams WM, Sutherland WJ, Whitehouse A, Amar A, Lambert RA, Linnell JDC, Watt A, Gutierrez RJ (2013) Understanding and managing conservation conflicts. Trends Ecol Evol 28: 100–109. https://doi.org/10.1016/j.tree.2012.08.021

Reed MS (2008) Stakeholder participation for environmental management: a literature review. Biological Conservation 141: 2417–2431. https://doi.org/10.1016/j.biocon.2008.07.014

Rosen T, Bath A (2009) Transboundary management of large carnivores in Europe: from incident to opportunity. Conservation Letters 2: 109–114. https://doi.org/10.1111/j.1755-263X.2009.00054.x

Røskaft E, Bjerke T, Kaltenborn BP, Linnell JDC (2003) Patterns of self-reported fear towards large carnivores among the Norwegian public. Evolution and Human Behaviour 24: 184–198. https://doi.org/10.1016/S1090-5138(03)00011-4

Salvatori V, Linnell JDC (2005) Report on the conservation status and threats for wolf (Canis lupus) in Europe. Council of Europe Report T-PVS/Inf (2005) 16, 24 pp.

Sandström C, Pellikka J, Ratamäki O, Sande A (2009) Management of large carnivores in Fennoscandia: new patterns of regional participation. Human Dimensions of Wildlife 14: 37–50. https://doi.org/10.1080/10871200802304726

Skogen K, Krange O (2003) "A wolf at the gate: The anti-carnivore alliance and the symbolic construction of community." Sociologia Ruralis 43(3): 309–325. https://doi.org/10.1111/1467-9523.00247

Skogen K, Krange O, Figari H (2013) Ulvekonflikter: en sosiologisk studie. Akademika forlag, Oslo, 270 pp.

Skogen K, Mauz I, Krange O (2006) "Wolves and Eco-power. A French-Norwegian Analysis of the Narratives of the Return of Large Carnivores." Journal of Alpine Research 94(4): 78–87. https://doi.org/10.3406/rga.2006.5593

Starling MJ, Branson N, Thomson PC, McGreevy PD (2013) "Boldness" in the domestic dog differs among breeds and breed groups. Behavioural Processes 97: 53–62. https://doi.org/10.1016/j.beproc.2013.04.008

Strand GH (2016) Rovviltbestandenes betydning for landbruk og matproduksjon basert på norske ressurser. NIBIO 2/63/2016, 128 pp.

Swenson JE, Sandegren F, Bjärvall A, Wabakken P (1998) Living with success: research needs for an expanding brown bear population. Ursus, International Conference on Bear Research and Management 10: 17–23.

Treves A, Krofel M, McManus J (2016) Predator control should not be a shot in the dark. Frontiers in Ecology and the Environment 14: 380–388. https://doi.org/10.1002/fee.1312

Trouwborst A (2010) Managing the carnivore comeback: international and EU species protection law and the return of lynx, wolf and bear to western Europe. Journal of Environmental Law 22: 347–372. https://doi.org/10.1093/jel/eqq013

Trouwborst A (2015a) Global large carnivore conservation and international law. Biodiversity and Conservation 24: 1567–1588. https://doi.org/10.1007/s10531-015-0894-8

Trouwborst A (2015b) Law and conservation conflicts. In: Redpath SM, Gutiérrez RJ, Wood KA, Young JC (Eds) Conflicts in conservation: navigating towards solutions. Cambridge University Press, Cambridge, 108–118. https://doi.org/10.1017/CBO9781139084574.009

Trouwborst A, Boitani L, Linnell JDC (2017a) Interpreting 'favourable conservation status' for large carnivores in Europe: how many are needed and how many are wanted? Biodiversity and Conservation 26: 37–61. https://doi.org/10.1007/s10531-016-1238-z

Trouwborst A, Fleurke F, Linnell JDC (2017b) Norway's Wolf Policy and the Bern Convention on European Wildlife: Avoiding the "Manifestly Absurd". Journal of International Wildlife Law & Policy in press.

Tveraa T, Stien A, Broseth H, Yoccoz NG (2014) The role of predation and food limitation on claims for compensation, reindeer demography and population dynamics. Journal of Applied Ecology 51: 1264–1272. https://doi.org/10.1111/1365-2664.12322

Vucetich JA, Bruskotter JT, Nelson MP, Peterson RO, Bump JK (2017) Evaluating the principles of wildlife conservation: a case study of wolf (Canis lupus) hunting in Michigan, United States. Journal of Mammalogy 98: 53–64.